

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 13 MAY 2005

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Applicant's or agent's file reference KL88060	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. <b>PCT/KR2003/002911</b>	International filing date (day/month/year) <b>30 DECEMBER 2003 (30.12.2003)</b>	Priority date (day/month/year) 31 DECEMBER 2002 (31.12.2002)
International Patent Classification (IPC) or national classification and IPC <b>IPC7 C08L 59/04, C08L 67/00, C08L 23/04</b>		
Applicant <b>KOLON INDUSTRIES, INC. et al</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 2 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand <b>19 JULY 2004 (19.07.2004)</b>	Date of completion of this report <b>19 APRIL 2005 (19.04.2005)</b>
Name and mailing address of the IPEA/KR  Korean Intellectual Property Office 920 Dunsan-dong, Seo-gu, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer <b>HONG, SUNG RAN</b>  Telephone No. 82-42-481-8146

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/KR2003/002911

## I. Basis of the report

### 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
 pages 1 - 11, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☒ the claims:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, as amended (together with any statement) under Article 19  
 pages \_\_\_\_\_, filed with the demand  
 pages 12 - 13, filed with the letter of 23.02.2005
- ☐ the drawings:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

### 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language English which is

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☒ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

### 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

### 4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets \_\_\_\_\_

### 5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed," and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION

International application No.

PCT/KR2003/002911

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	1 - 9	YES
	Claims	None	NO
Inventive step (IS)	Claims	1 - 9	YES
	Claims	None	NO
Industrial applicability (IA)	Claims	1 - 9	YES
	Claims	None	NO

**2. Citations and explanations (Rule 70.7)**

Claim 9 in the present invention has been amended. The scope of this claim has not been extended beyond the disclosure of the patent application as originally filed.

Reference is made to the following documents from the International Search Report(ISR):

D1: US 6,194,515 A (27 February 2001)

D2: EP 432888 A2 (19 June 1991)

**1. Novelty and Inventive step**

The present claims 1~9 relate to a toughened polyoxymethylene resin composition, comprising (a) 100 parts by weight of a polyoxymethylene resin, (b) 5-60 parts by weight of a polyether-ester block copolymer derived from copolymerization of a hard segment including a dicarboxylic acid component and a glycol component and a soft segment including a poly(tetramethylene oxide)terephthalate unit, and (c) 0.1-10 parts by weight of a modified polyethylene polymer, with a blot impact strength not less 5J, an Izod notch impact strength no less than 10 kg·cm/cm, and a tensile strength not less than 550 kg/cm<sup>2</sup>, wherein the resin has a dispersion phase amounting from 2 to 5  $\mu$ m when a molded article of the composition is broken at low temperatures.

D1 is considered to represent a polyacetal composition with improved toughness containing 100 wt% of polyacetal and 0.5-5 wt% of a block copolymer, which has its central portion made of an amorphous polymer that forms an elastic domain at a room temperature, and polyethylene glycol chains with molecular weight of 2000 or higher at its two ends:

(Continued in Supplemental box.)

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of:

Box V.

D2 discloses a high impact resistant polyacetal composition exhibiting excellent antistaticity, which comprises (a) a polyacetal comprising at least 50% oxymethylene units, (b) a low molecular weight elastomeric polyester-based polyurethane, and (c) an antistatic agent comprising a polyhydric alcohol fatty acid ester which contains a hydroxyl group and polyethylene glycol.

D1 is considered to represent the closest prior art for the subject matter of the present claims 1~9.

Comparing claims 1~9 of the present invention with D1, both inventions are the same in preparing a polyoxymethylene resin composition with improved toughness comprising a polyacetal and a block copolymer.

However, the claims 1~9 of the present invention differ from D1 in a component of a block copolymer and a resin composition such as a modified polyethylene polymer. Accordingly, the present invention is not considered to be easily invented from the invention disclosed in D1 by a person skilled in the art.

Therefore, the subject matter of the present claims 1-9 is considered to be novel and inventive in Article 33(2) and 33(3) PCT.

## 2. Inventive Applicability

It is an objective of the present invention to provide a toughened polyoxymethylene resin composition. There is no reason to negate the industrial applicability of this invention. Consequently, the claims 1~9 appear to meet the requirements of Article 33(4) PCT.

Claims

1. A toughened polyoxymethylene resin composition, comprising (a) 100 parts by weight of a polyoxymethylene resin, (b) 5-60 parts by weight of a polyether-ester block copolymer derived from copolymerization of a hard  
5 segment including a dicarboxylic acid component and a glycol component and a soft segment including a poly(tetramethylene oxide)terephthalate unit, and (c) 0.1-10 parts by weight of a modified polyethylene polymer, with a dot impact strength not less than 5 J, an Izod notch impact strength not less than 10 kg-cm/cm, and a tensile strength not less than 550 kg/cm<sup>2</sup>, wherein the resin has a  
10 dispersion phase amounting to 2 to 5  $\mu$ m when a molded article of the composition is broken at low temperatures.

2. The composition as defined in claim 1, wherein the dicarboxylic acid component comprises terephthalic acid alone, or a mixture of terephthalic acid and any one of aromatic dicarboxylic acid and alicyclic dicarboxylic acid.

15 3. The composition as defined in claim 1, wherein the dicarboxylic acid component comprises a mixture of 70 wt% or more of terephthalic acid and 30 wt% or less of any one selected from the group consisting of aromatic dicarboxylic acid, alicyclic dicarboxylic acid, and mixtures thereof.

20 4. The composition as defined in claim 2 or 3, wherein the aromatic dicarboxylic acid is selected from the group consisting of isophthalic acid, phthalic acid, naphthalene-2,6-dicarboxylic acid, diphenyl-4,4'-dicarboxylic acid, 3-sulfoneisophthalic acid, and mixtures thereof.

25 5. The composition as defined in claim 2 or 3, wherein the alicyclic dicarboxylic acid is selected from the group consisting of oxalic acid, succinic acid, adipic acid, azellic acid, sebacic acid, dodecanoic acid, dimer acid, and mixtures thereof.

6. The composition as defined in claim 1, wherein the glycol component comprises 1,4-butanediol alone, or 50 wt% or more of 1,4-butanediol and 50 wt% or less of a copolymerizable component selected from the group consisting of ethyleneglycol, diethyleneglycol, propyleneglycol, 1,6-hexanediol, 1,10-  
5 decanediol, 1,4-dihydroxymethyl cyclohexane, bis(4-hydroxyethoxyphenyl)methane, neopentylglycol, and mixtures thereof.

7. The composition as defined in claim 1, wherein the soft segment comprises poly(tetramethylene oxide)glycol constituting the poly(tetramethylene oxide)terephthalate unit.

10 8. The composition as defined in claim 7, wherein the poly(tetramethylene oxide)glycol has a number average molecular weight of 500-20,000.

9. (amended) The composition as defined in claim 1, wherein the poly(tetramethylene oxide)carboxylate unit is used in an amount of 30 to 80 wt%.